SPECIFICATION

Revision
A

Pana-pacific Part No	Taoglas Description
PP407087	4 in1 GNSS LTE1 LTE2 WiFi

Hino Part Number	Hino Description
XXX.XXXX	

Product Features
2* LTE Antennas – LTE Bands 2,4,5,7,12,13,25,26 WCDMA Bands 1,2,4,5,8 GSM Bands 850,1900MHz 1* WIFI Antenna - 2.4GHz 1* GNSS Antenna - 1575.42 MHz/1602 MHz Dims:161*111.5*23.4 mm

1. Introduction

The PP407087 antenna is a 4-in-1, custom low profile, internal antenna for use on vehicles for telematics, transportation and remote monitoring applications. It delivers best in class LTE, GNSS and WIFI antenna performance.

2. Specification

MECHANICAL	
Antenna Dimensions	161*111.5*23.4 mm
Enclosure Material	ASA + PC
Weight (including cable)	9.3 oz
ENVIRONMENTAL	
Operation Temperature	-40°C to 85°C
Storage Temperature	-40°C to 90°C
Humidity	Non-condensing 65°C 95% RH

GNSS Antenna	
Frequency	1575.42/1602 MHz
Passive Antenna Efficiency	~ 50%
Antenna Bandwidth	~ 40MHz
Ceramic Patch Dim.	25*25*4 mm
Passive Antenna Average gain	~ -2dB
Passive Antenna Peak gain	3dBi
VSWR	1.2
Impedance	50Ω
Axial Ratio	< 3dB
Polarization	RHCP
Cable	914.4 mm Low-loss RG174
Connector	FAKRA C

LNA and Filter	
Frequency	1575.42/1602 MHz
Output Impedance	50 Ohm
Voltage	1.8-5.0V
LNA Gain	16 dB nominal
Current Draw	25mA
Noise Figure	2 dB

2G/3G/4G LTE Antennas

LTE	**B2**	**B4**	**B5**	**B7**	**B12**	**B13**	**B25**	**B26**
Frequency (MHz)	1850~1990	1710~2155	824~894	2500~2690	699~746	756~777	1850~1915	814~894
Efficiency (%)	55	45	40	30	30	40	55	40
Peak Gain (dBi)	6	6	2	3.5	0	1.5	6	2
Average Gain (dB)	-2	-3	-4	-5	-5	-4	-2	-4

WCDMA	**B1**	**B2**	**B4**	**B5**	**B8**
Frequency (MHz)	1920~2170	1850~1990	1710~2155	824~894	880~960
Efficiency (%)	55	55	45	40	30
Peak Gain (dBi)	6	6	6	2	2
Average Gain (dB)	-2	-2	-4	-4	-5

GSM	**850**	**1900**
Frequency (MHz)	824~894	1850~1910
Efficiency (%)	40	55
Peak Gain (dBi)	6	6
Average Gain (dB)	-3	-3

Impedance	50Ω
Polarization	Linear
Isolation	19 dB between LTE antennas (low band)
Isolation	30 dB between LTE antennas (high band)
Isolation	> 20 dB between LTE and GNSS antenna
Isolation	> 20 dB between LTE and WIFI
Cables	914.4 mm Low loss Rg-174 (QTY 2)
Connector	FAKRA D, FAKRA N

WIFI Antenna

Frequency (MHz)	WILAN 1	
	2400-2500	
Efficiency (%)	50	
Peak Gain (dBi)	4	
Average Gain (dB)	-2	

Impedance	50Ω
Polarization	Linear
VSWR	< 2.5:1
Cable	914.4 mm RG-174 low-loss
Connector	FAKRA I

3. Antenna Characteristics

3.1 GNSS Antenna

3.1.1 GNSS Efficiency (Passive antenna)

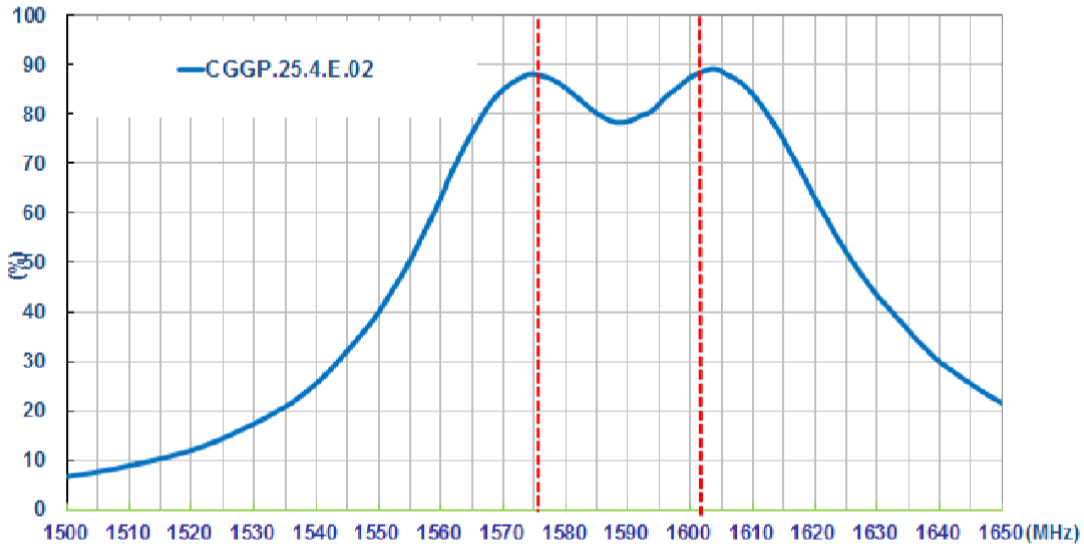


Figure 1. *Typical GNSS Antenna Efficiency*

3.1.2 GNSS Average gain (Passive antenna)

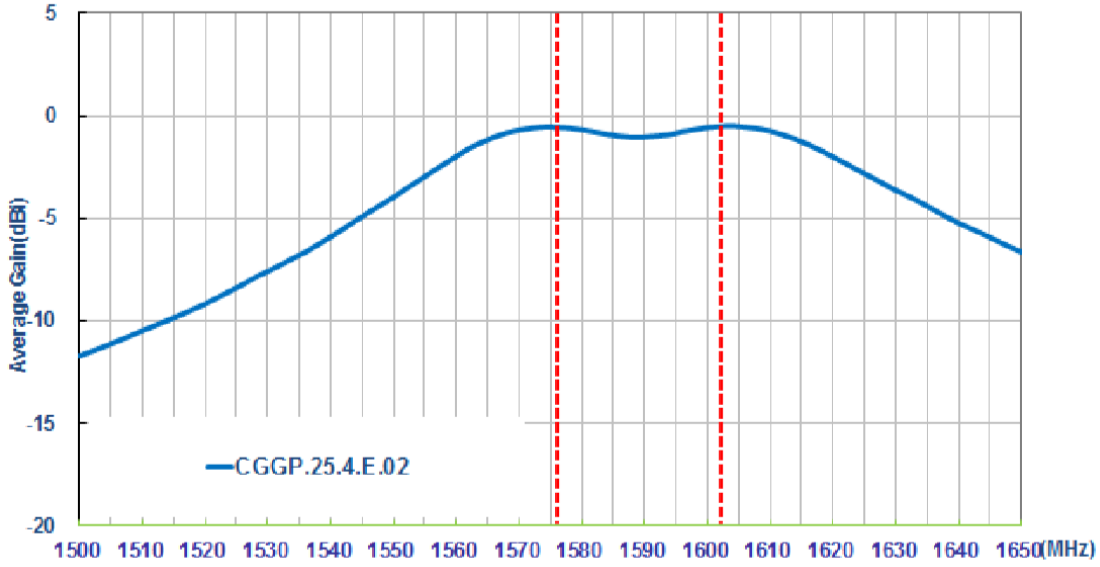
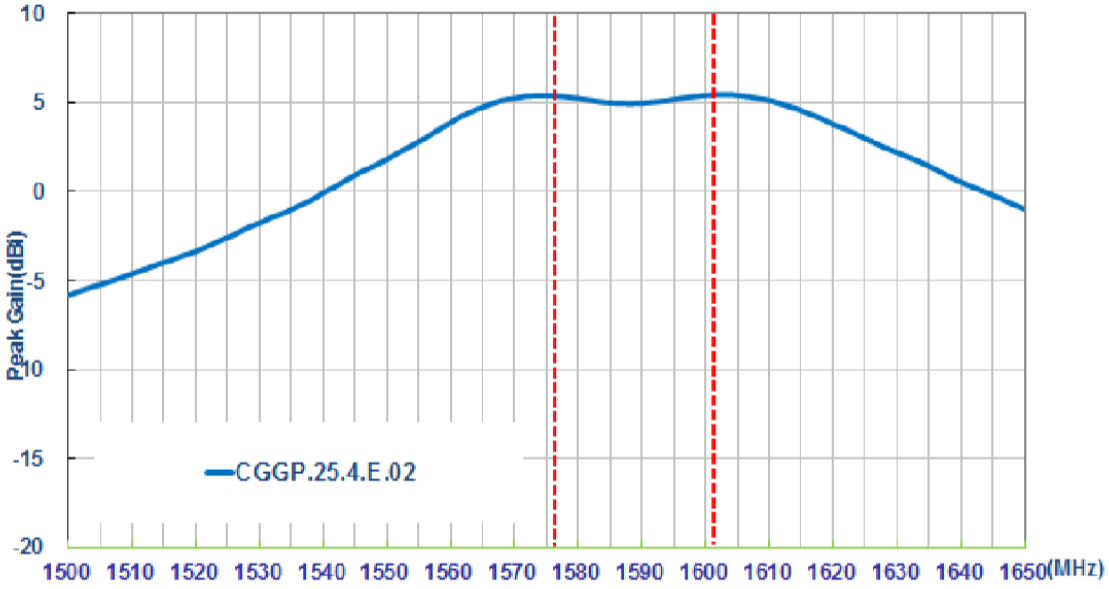


Figure 2. *Typical GNSS Antenna Average Gain*

3.1.3 GNSS Peak gain (Passive antenna)



3.1.4 GNSS LNA Gain and Noise Figure (Active antenna) @3V

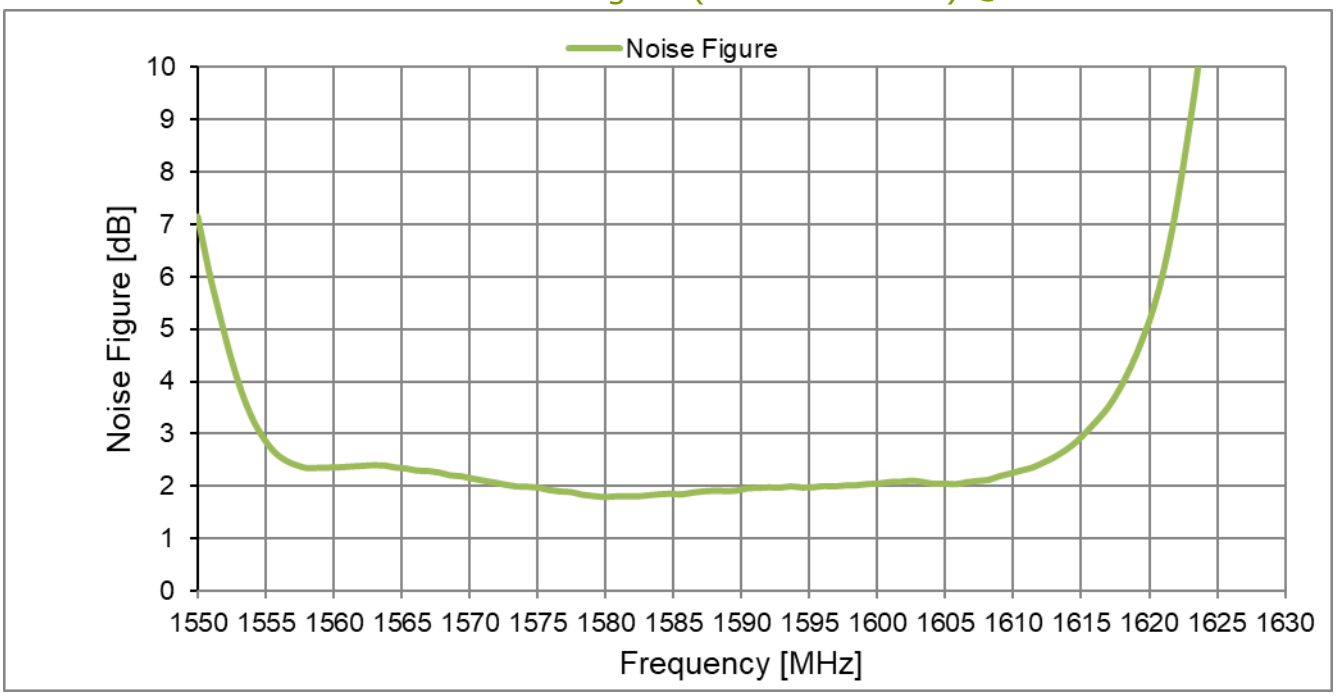


Figure 3. Typical Noise Figure

Figure 4. Typical Active GNSS Gain

3.1.5 Out Band Rejection (Active antenna)

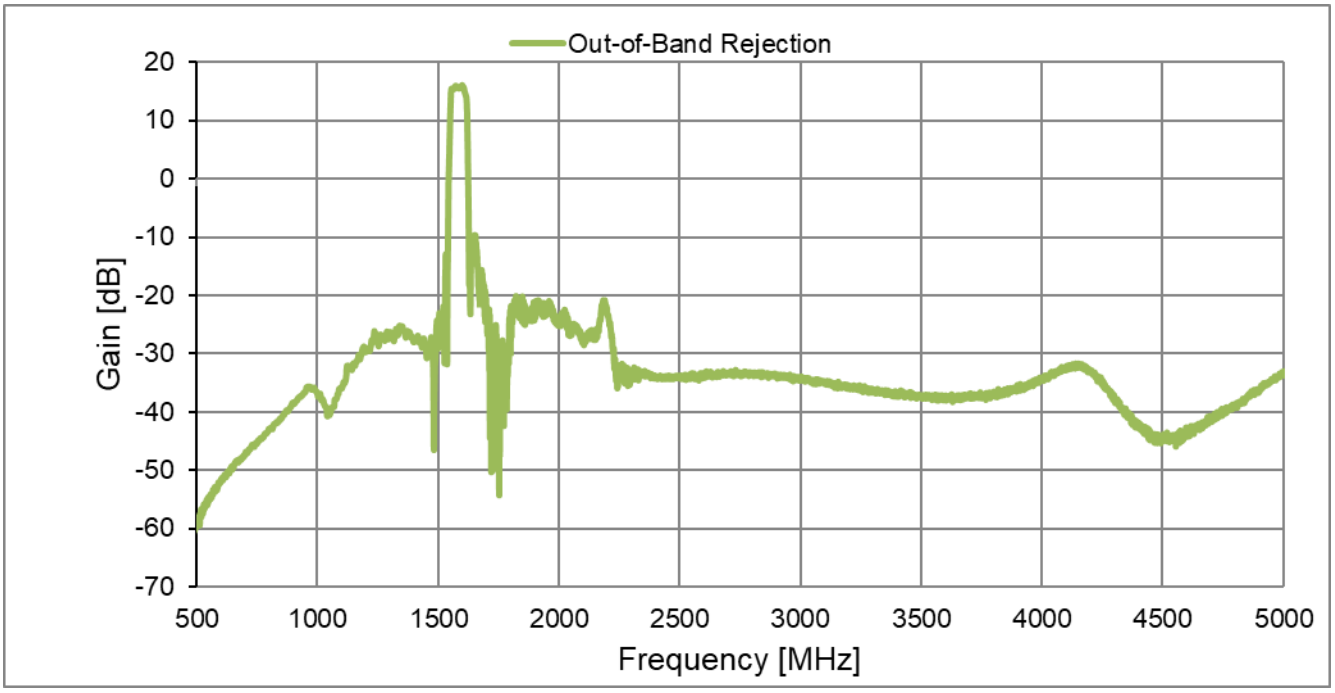
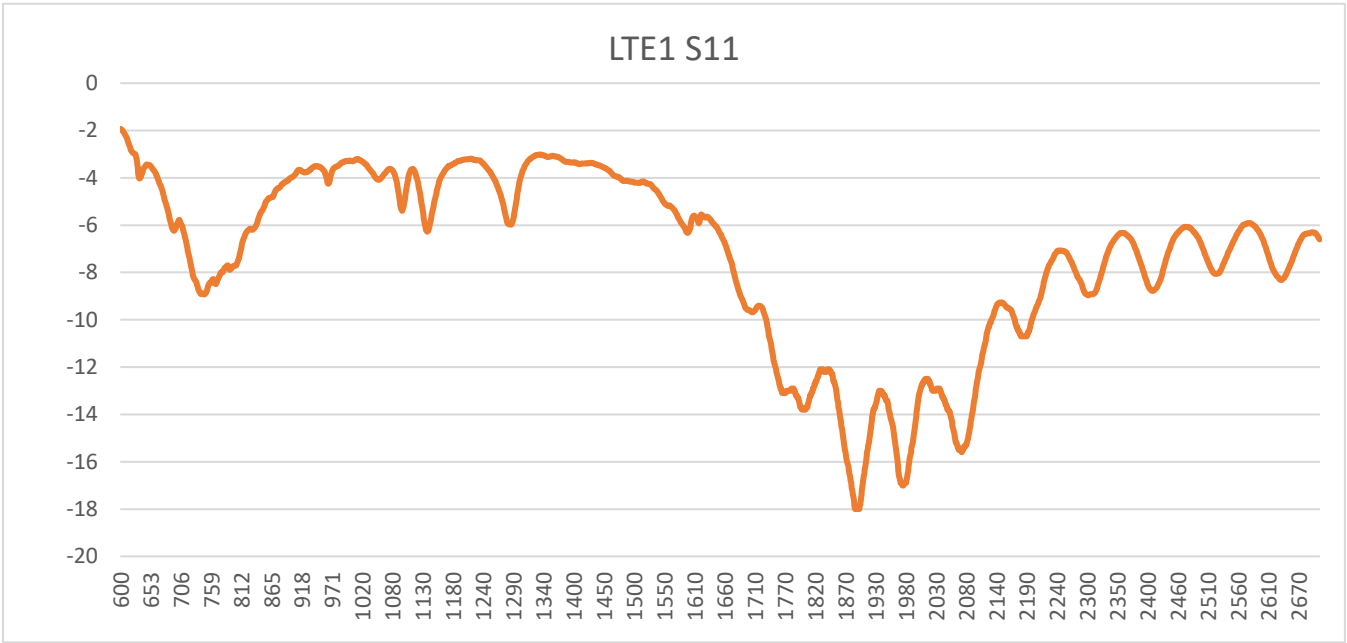


Figure 5. Typical Out-of-band Rejection

3.2 LTE Antenna 30cm*30cm Ground Center

3.2.1 Return Loss (LTE)



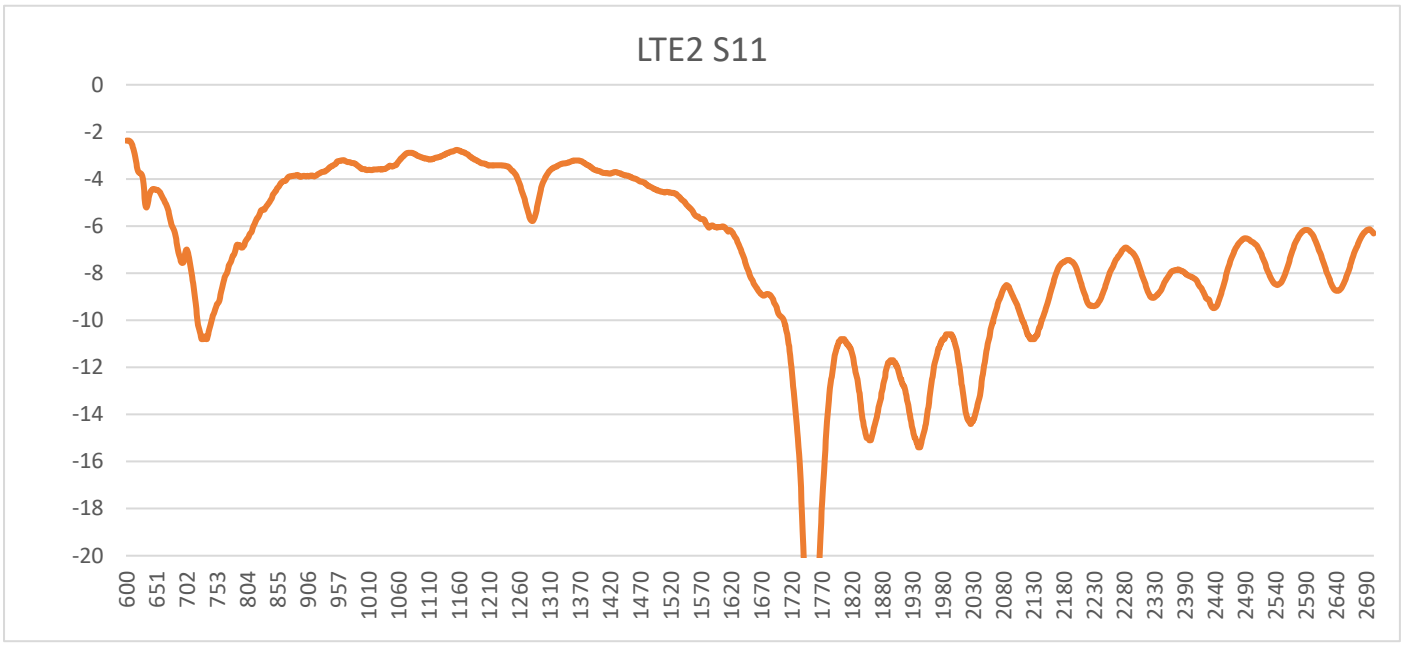
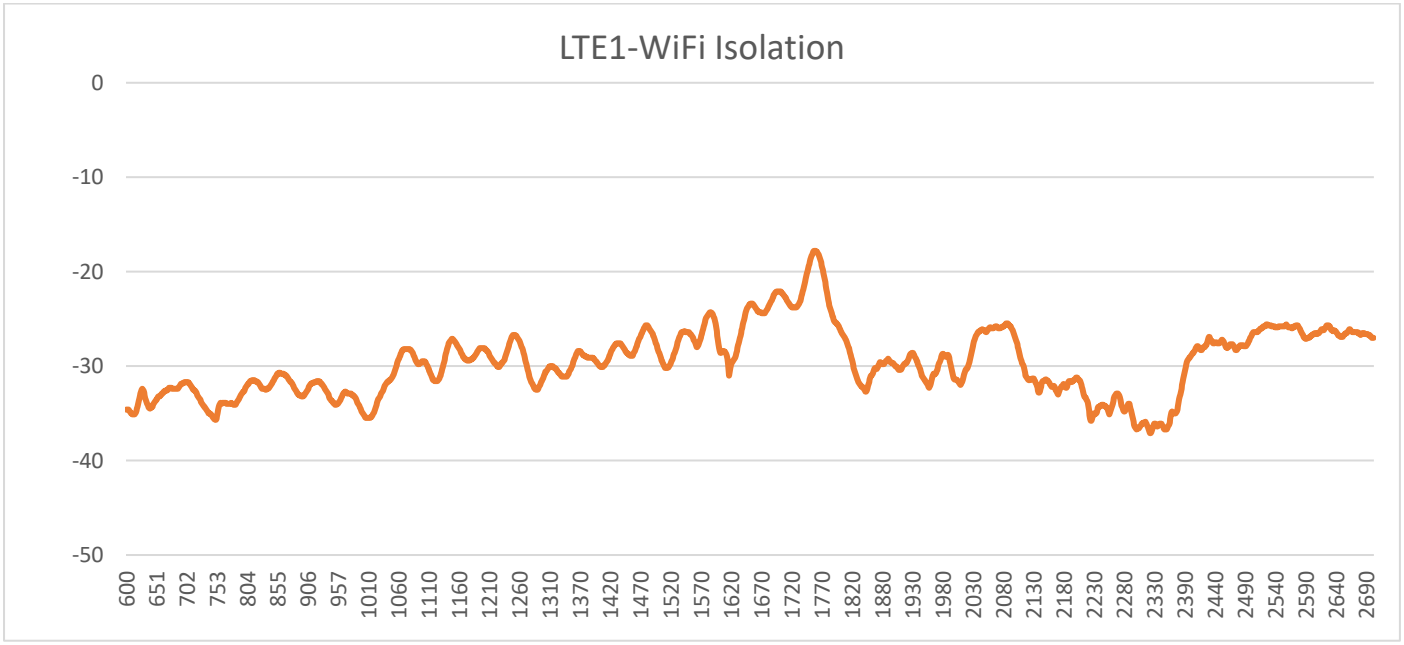


Figure 6. *Typical LTE Antenna Return Loss*

3.2.2 Isolation



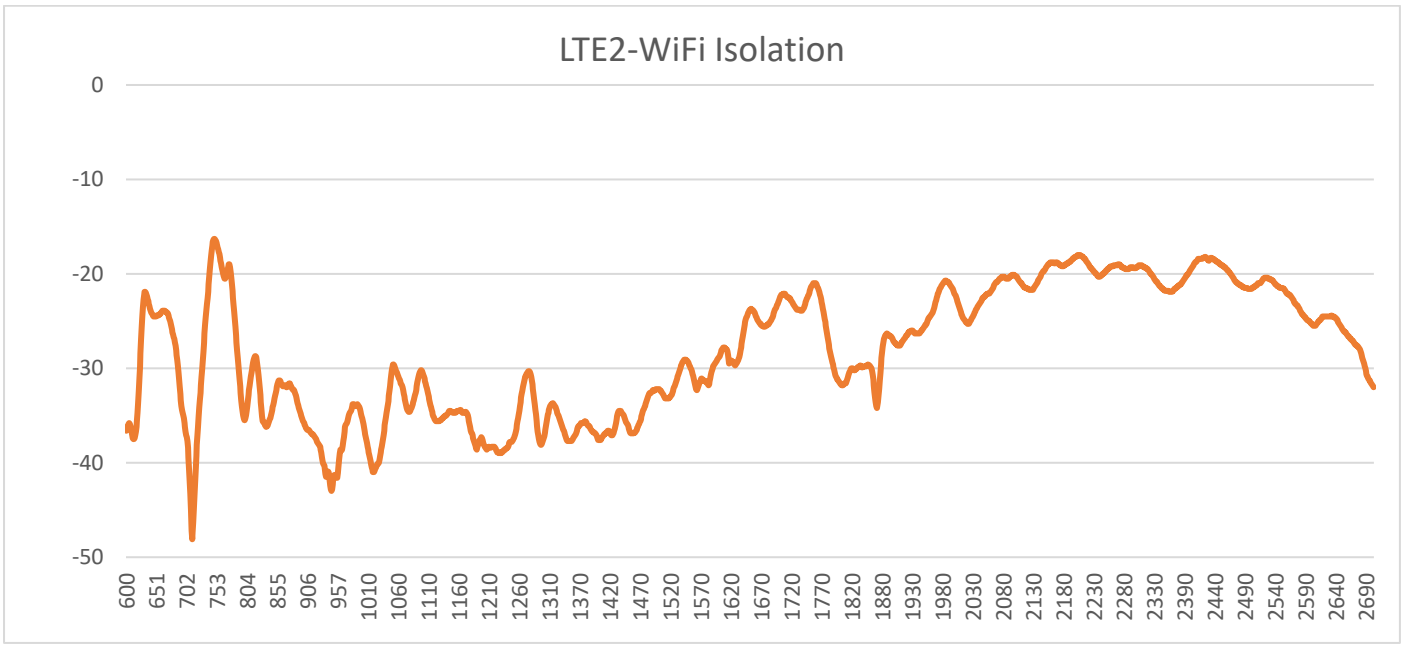


Figure 7. *Isolation Between LTE and WIFI Antenna*

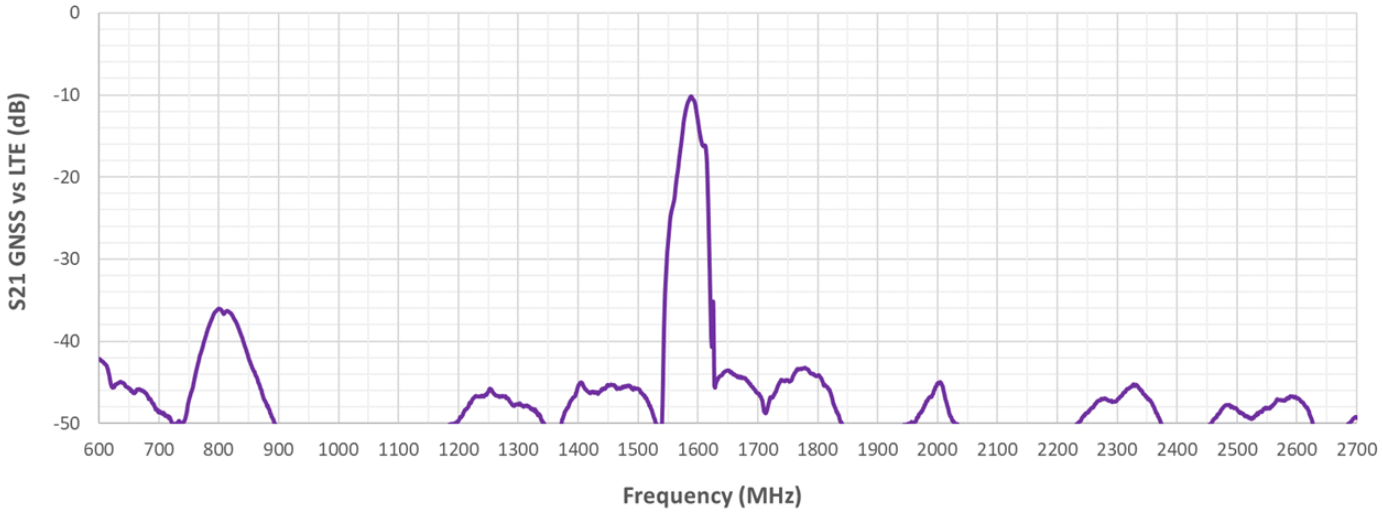


Figure 8. *Isolation Between LTE and Passive GNSS Antenna*

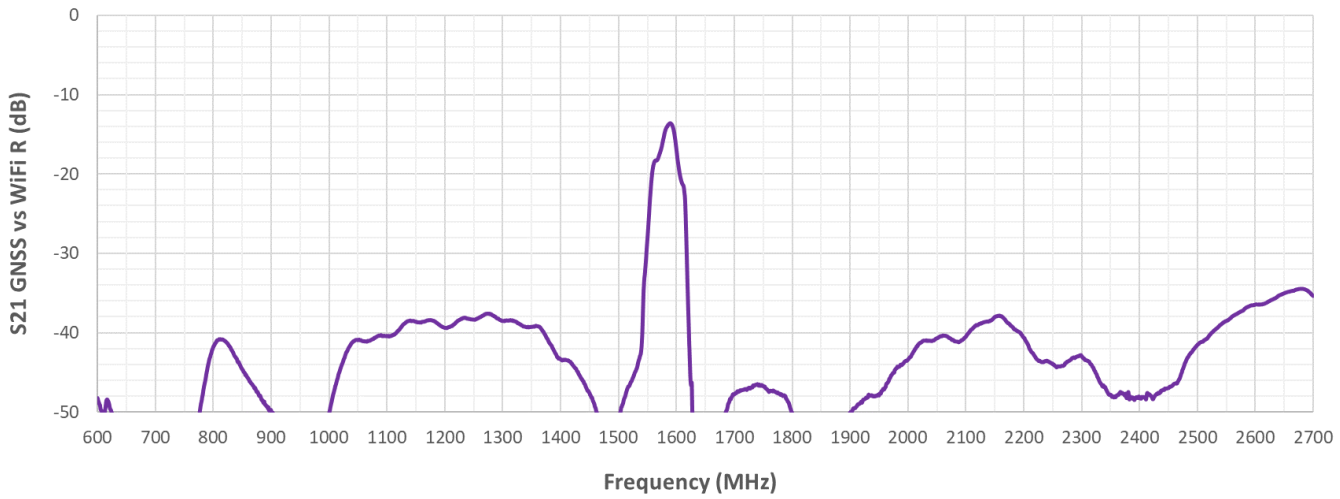
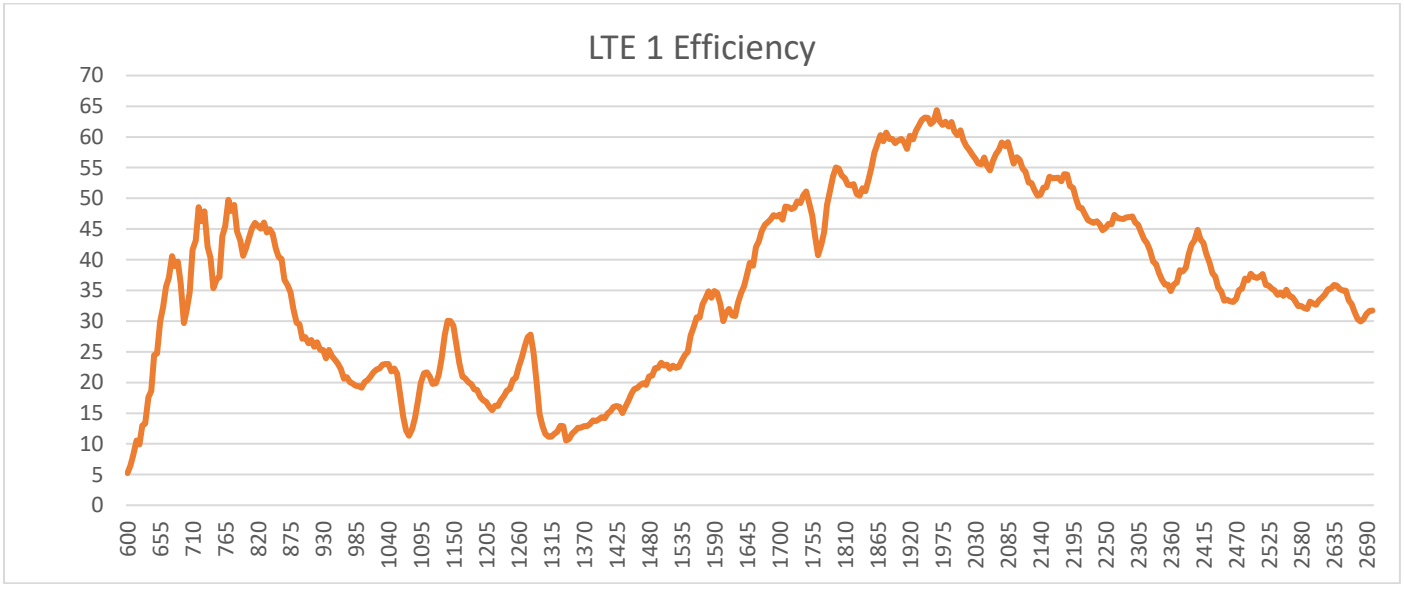


Figure 9. *Isolation Between GNSS and WiFi Antenna*

3.2.3 Efficiency (LTE)



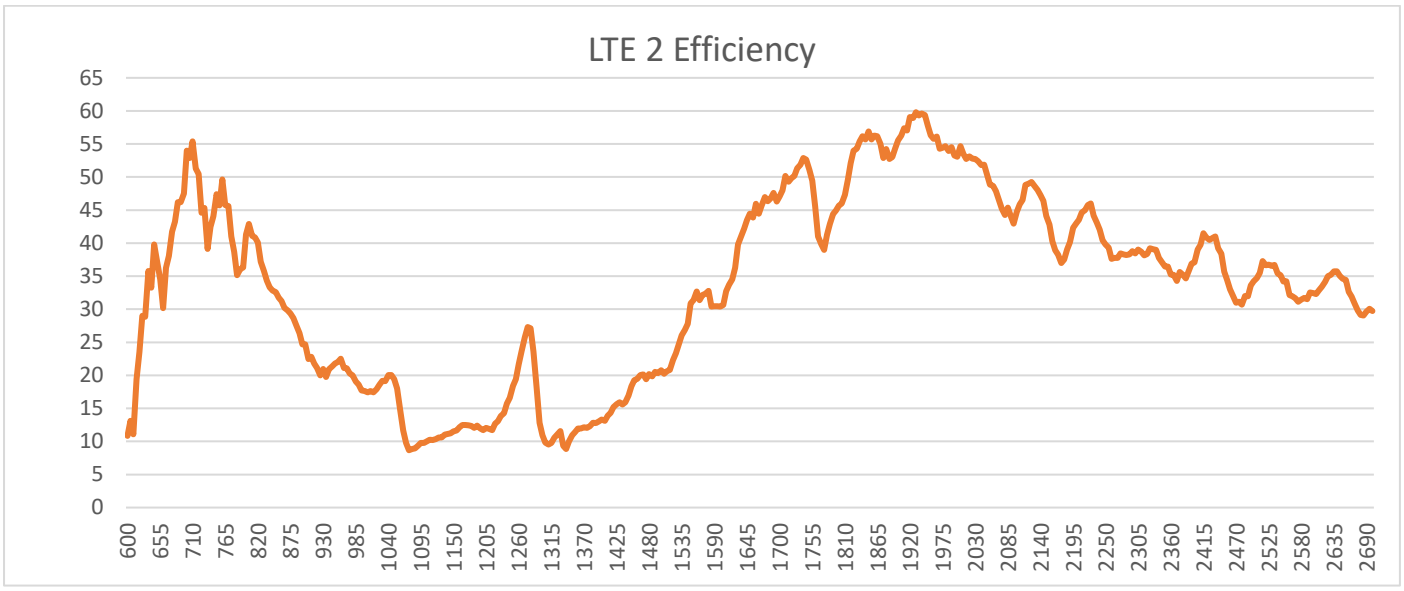
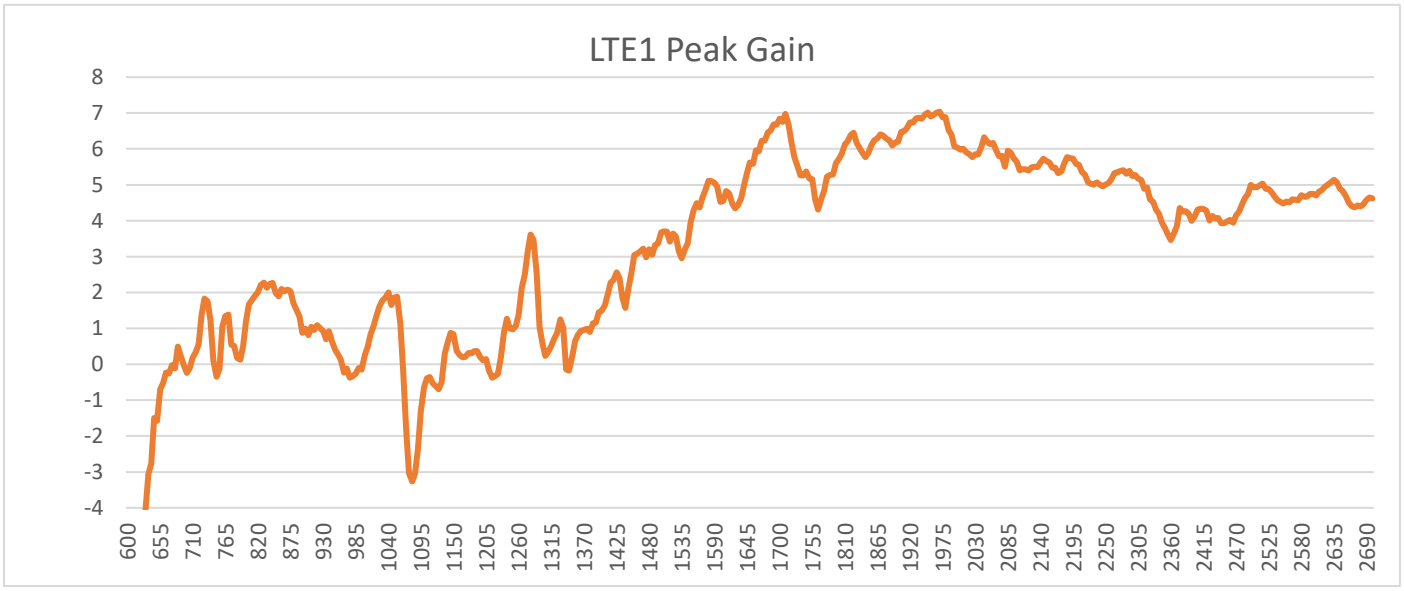


Figure 10. *LTE Antenna Efficiency*

3.2.4 Peak Gain (LTE)



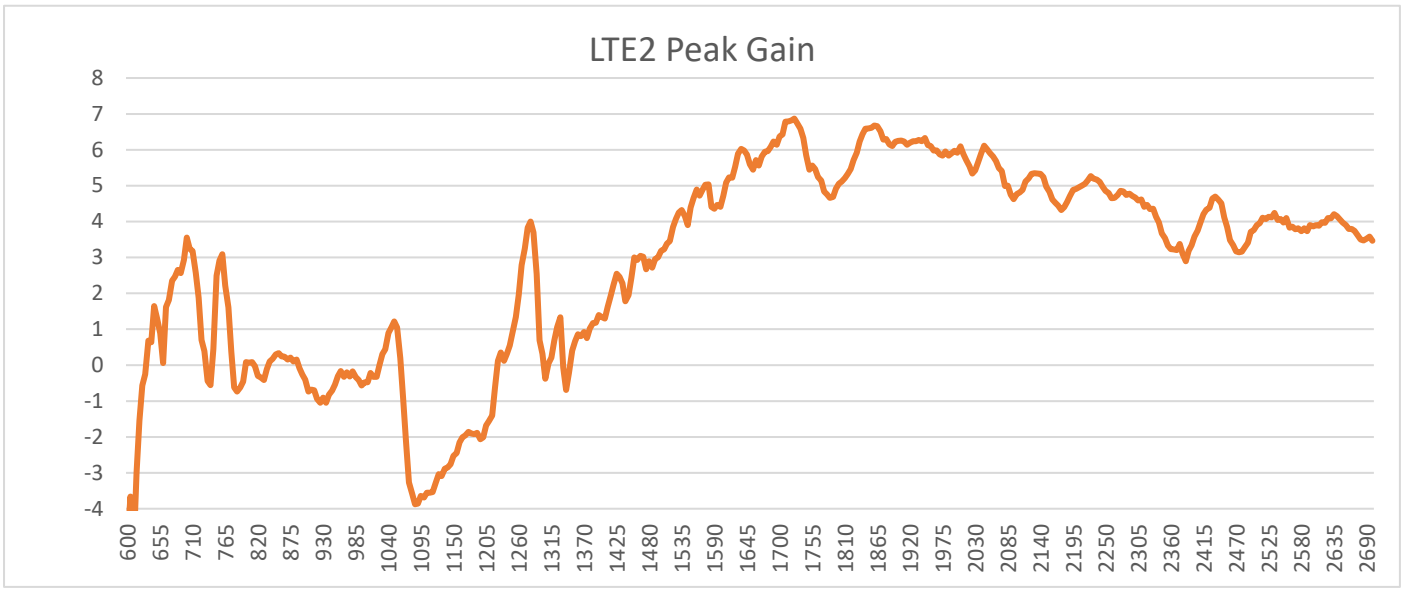


Figure 11. *Typical LTE Antenna Peak Gain*

3.3 WIFI on 30cm*30cm Ground Center

3.3.1 Return Loss (WiFi)

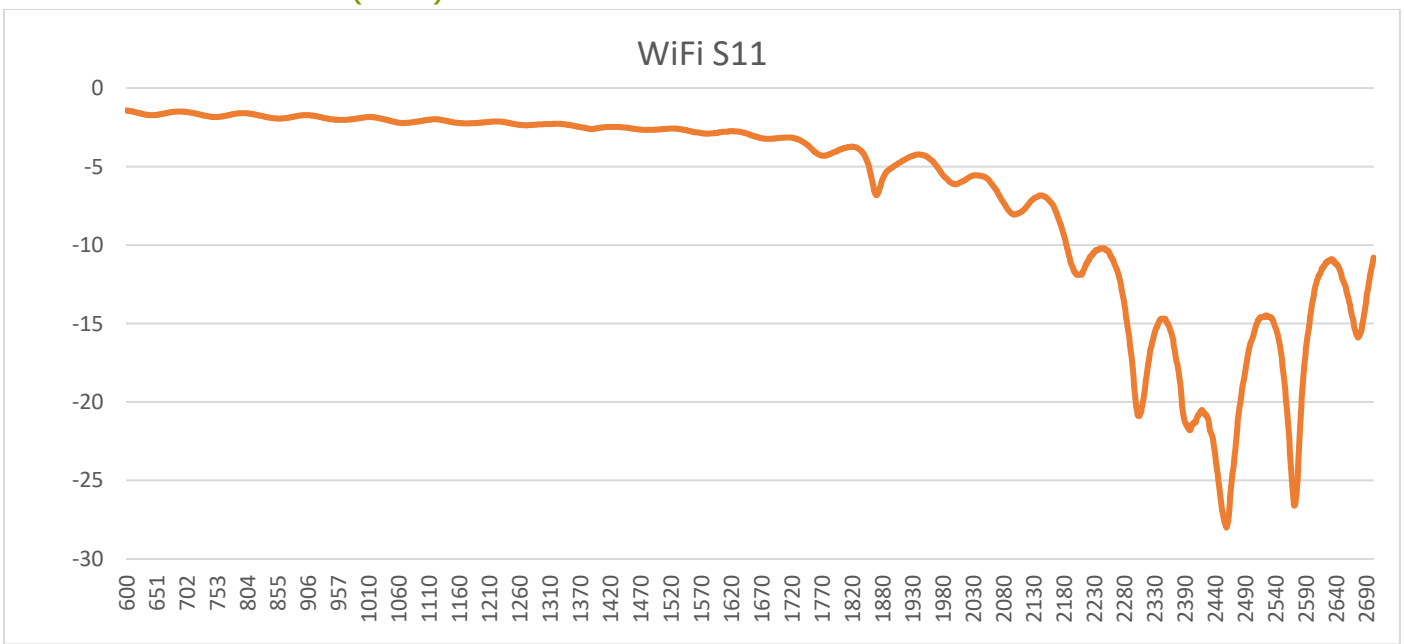


Figure 12. *Typical WIFI Antenna Return Loss*

3.3.2 Efficiency (WIFI)

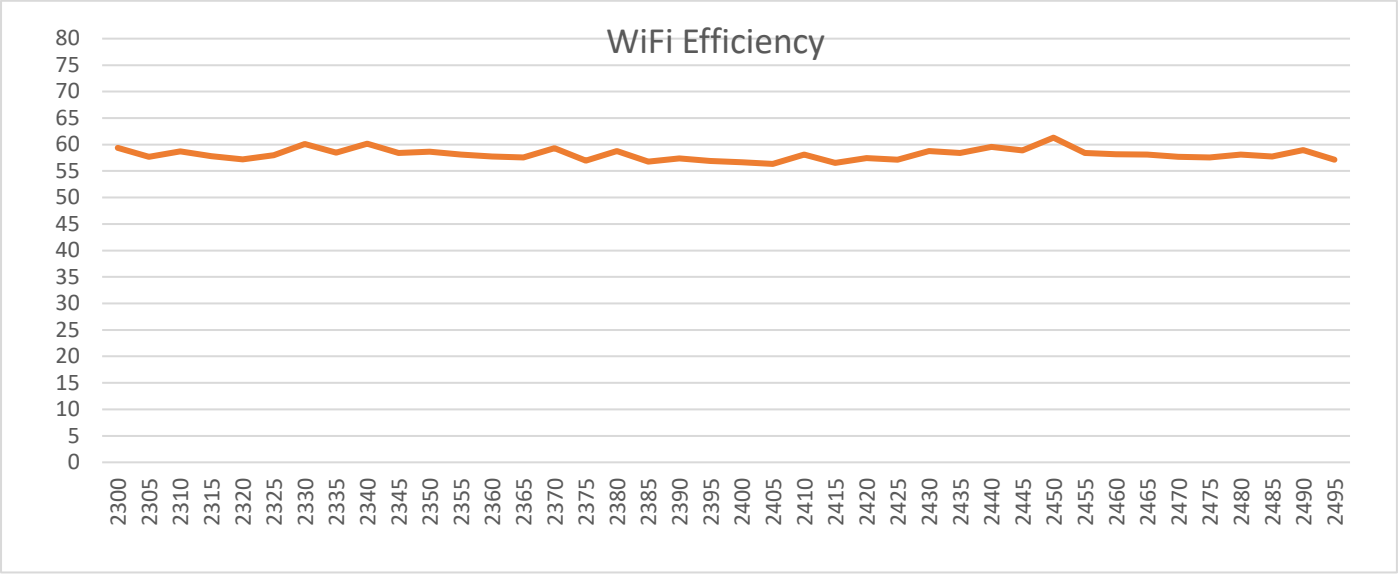


Figure 13. *Typical WIFI Antenna Efficiency*

4. Reliability Test Summary

4.1 High Temperature Test

Test Parameters	Test House	Humidity (%)	Temperature (°C)	Duration (hours)	Cycles	Physical Inspection	Functional Inspection
Sample QTY: 3	Taoglas Taiwan	0	85	48	1		

4.2 Low Temperature Test

Test Parameters	Test House	Humidity (%)	Temperature (°C)	Duration (hours)	Cycles	Physical Inspection	Functional Inspection
Sample QTY: 3	Taoglas Taiwan	0	-40	48	1		

4.3 Thermal Cycle Test

Test Parameters	Test House	Humidity (%)	Temperature (°C)	Duration (hours)	Cycles	Physical Inspection	Functional Inspection
Sample QTY: 3	Taoglas Taiwan	0	-40 and 85	8	12		

4.4 Humidity and Thermal Cycle Test

Test Parameters	Test House	Humidity (%)	Temperature (°C)	Duration (hours)	Cycles	Physical Inspection	Functional Inspection
Sample QTY: 3	Taoglas Taiwan	95% @ 38C Else 65%	-40 and 85	8	12		

4.5 Thermal Shock Test

Test Parameters	Test House	Humidity (%)	Temperature (°C)	Duration (hours)	Cycles	Physical Inspection	Functional Inspection
Sample QTY: 1	SGS Taiwan	55 +/- 20%	-40 and 85	2	42		

4.6 Random Vibration

Test Parameters	Test House	Frequency (Hz)	Temperature (°C)	Duration (hours)	Number of Axes	Physical Inspection	Functional Inspection
Sample QTY: 2	Taoglas Taiwan	10 to 2000	23	24 per Axis	3		

4.7 Mechanical Operational Shock Test

Test Parameters	Test House	Wave Type	Peak g Value	Shock Duration	Shock per Axis	Number of Axes	Physical Inspection	Functional Inspection
Sample QTY: 3	Taoglas Taiwan	Haft Wave	30G	11ms	3	6		

4.8 Combined environmental Test

Test Parameters	Test House	Random Vibration	Humidity (%)	Temperature (°C)	Duration (hours)	Number of Axes	Physical Inspection	Functional Inspection
Sample QTY: 3	SGS Taiwan	10 to 2000 Hz	55 +/- 20%	-40 and 85	24 per Axis	3		

4.9 Drop Test

Test Parameters	Test House	Drop Height	Number of Axes	Duration (hours)	Cycles	Physical Inspection	Functional Inspection
Sample QTY: 3	Taoglas	1m	3	N/A	1		

	Taiwan						

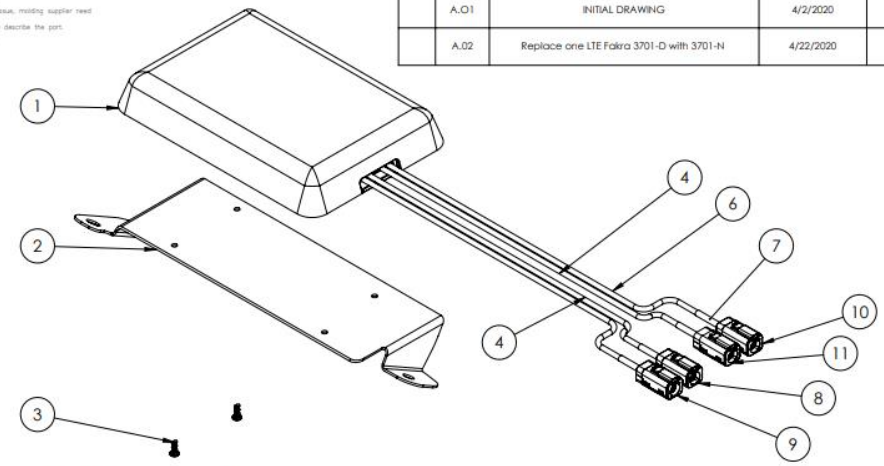
4.10 ESD Test

Test Parameters	Test House	Humidity (%)	Temperature (°C)	Discharge Type	Discharge Level	Physical Inspection	Functional Inspection
Sample QTY: 3	Taoglas Taiwan	65 +/- 20%	23	Air and Contact	15KV Air and 8kV contact		

5. Drawings

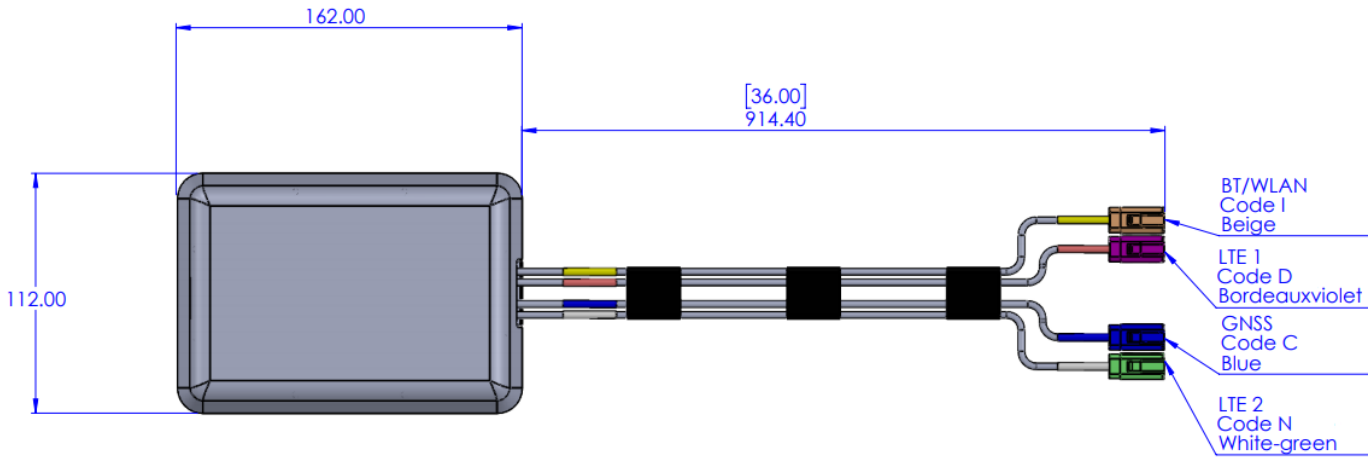
ISO NO.:
STATE: Release
NOTES: 1.All material must be RoHS compliant.
2.Color Codes:
3.Finish:
4.Deburring: Less than 0.02mm.
5.No gate, parting line and any other tooling marks on appearance of product.
6.Once product have any crack/break/thread damage or any structural tooling issue, molding supplier need to correct the issue unconditionally.
7.Use this drawing together with the corresponding 3D CAD database file to fully describe the part.
8.The connector orientation has a fixed position to the antenna as per drawing.
9."*" Critical Dimensions.

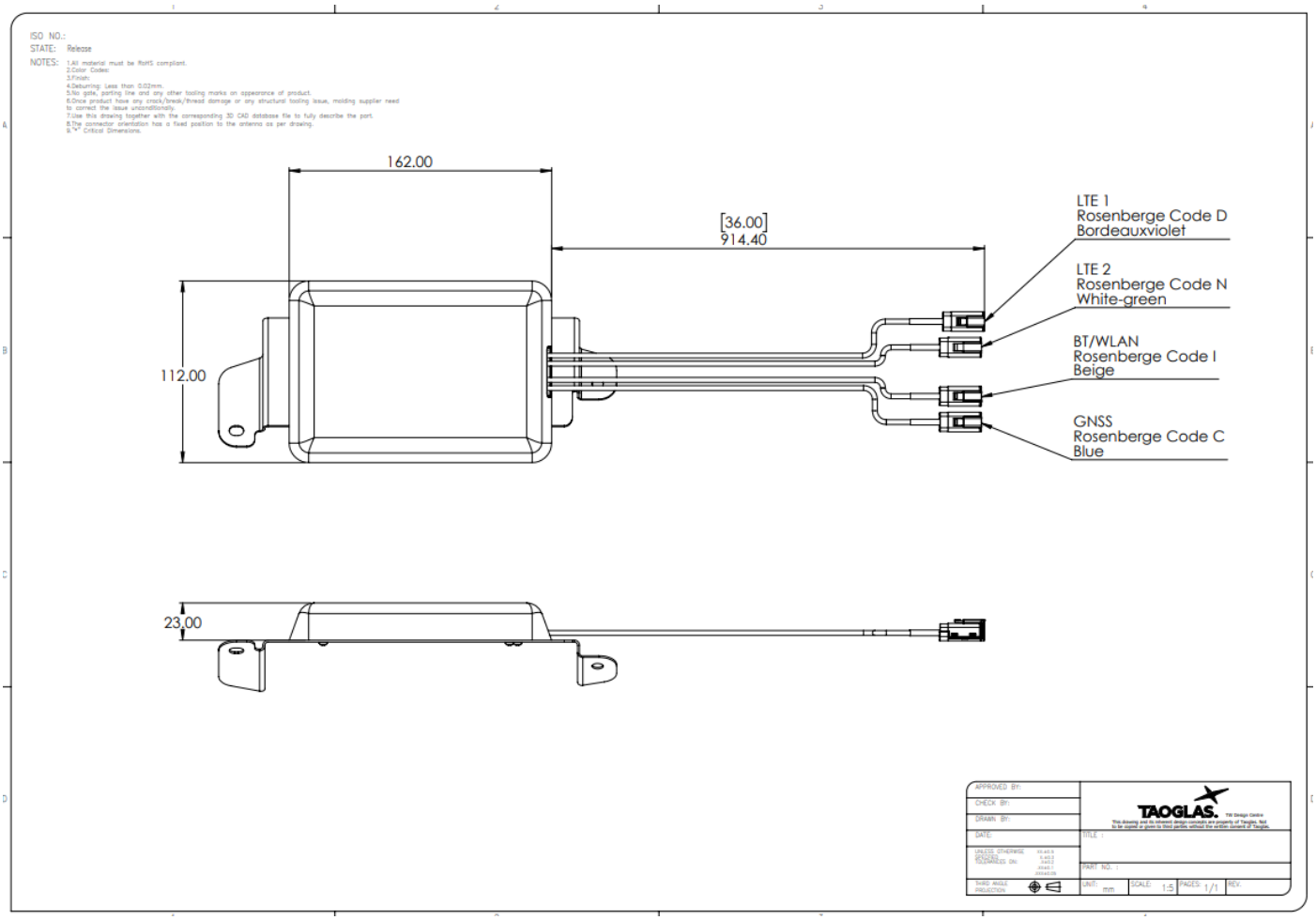
REVISIONS					
ZONE	REV.	DESCRIPTION	DATE	DRAWN	APPROVED
	A.01	INITIAL DRAWING	4/2/2020	H.THERON	H.THERON
	A.02	Replace one LTE Fakra 3701-D with 3701-N	4/22/2020	H.THERON	H.THERON



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	TBD	ANTENNA	
2	TBD	ANTENNA BRAKET	1
3	TBD	No5X5/16" ROUNDED HEAD THREAD-FORMING SCREW	4
4	TBD	1.5DS-QGB CABLE FOR LTE	2
5	TBD	1.5DS-QGB CABLE FOR WIFI	1
6	TBD	RG-174 GPS CABLE	1
7	TBD	HEAT SINK	4
8	3701-I	STANDARD FAKRA 1 SMB STRAIGHT FEMALE CRIMP FROM AIMMET OR EQUIVALENT	1
9	3701-C	STANDARD FAKRA 1 SMB STRAIGHT FEMALE CRIMP FROM AIMMET OR EQUIVALENT	1
10	3701-D	STANDARD FAKRA 1 SMB STRAIGHT FEMALE CRIMP FROM AIMMET OR EQUIVALENT	1
11	3701-N	STANDARD FAKRA 1 SMB STRAIGHT FEMALE CRIMP FROM AIMMET OR EQUIVALENT	1

APPROVED BY: H.THERON
CHECK BY: H.THERON
DRAWN BY: H.THERON
DATE: 4/2/2020
TITLE: HINO ANTENNA
PART NO.: TBD
UNIT: mm | SCALE: 1:5 | PAGES: 1/1 | REV: A.02




ISO NO.:
STATE: Release
NOTES: 1.All material must be RoHS compliant.
2.Color Codes:
3.Finish:
4.Deburring: Less than 0.02mm.
5.No gate, parting line and any other tooling marks on appearance of product.
6.Once product have any crack/break/thread damage or any structural tooling issue, molding supplier need to correct the issue unconditionally.
7.Use this drawing together with the corresponding 3D CAD database file to fully describe the part.
8.The connector orientation has a fixed position to the antenna as per drawing.
9."*" Critical Dimensions.
162.00
[36.00]
914.40
112.00
23.00
LTE 1
Rosenberge Code D
Bordeauxviolet
LTE 2
Rosenberge Code N
White-green
BT/WLAN
Rosenberge Code I
Beige
GNSS
Rosenberge Code C
Blue
APPROVED BY:
CHECK BY:
DRAWN BY:
DATE:
UNLESS OTHERWISE SPECIFIED TOLERANCES ON:
THIRD ANGLE PROJECTION
TAOGLAS.
TITLE :
PART NO. :
UNIT: mm
SCALE: 1:5
PAGES: 1/1
REV: